

# DoD Emerging Contaminants Program

Acquisition, Technology and Logistics

## Environmental Monitoring & Data Quality Workshop



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# Operating Environment & Trends

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- **Use of Precautionary Principle**
  - We must understand health & environmental effects before using chemicals
- **Biomonitoring — What's showing up in humans?**
  - Centers for Disease Control's national biomonitoring & California voluntary program
- **Evolving Risk Assessment Science & Process**
- **Strict Chemical Management & Green Chemistry**
  - Cradle to grave management
- **International, Federal, & State Toxic Substances Laws**
  - EPA's Chemical Actions Plans & "Chemical Safety for Sustainability"
    - Restrictions or banning of chemicals/materials
  - California Green Chemistry Law
  - European Union's "REACH" regulation for chemical management
  - Pending TSCA<sup>1</sup> reform

<sup>1</sup> Toxic Substances Control Act

# What is an Emerging Contaminant?

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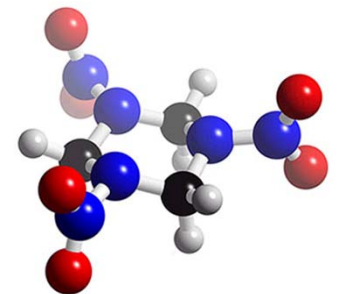
- Chemicals & materials that have pathways to enter the environment and present potential unacceptable human health or environmental risks...

**and either**

- do not have peer-reviewed human health standards

**or**

- Standards/regulations are evolving due to new science, detection capabilities, or pathways.



# How Can ECs Affect DoD?

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- **Cause adverse health effects on operating forces, DoD employees, and/or public**
  - Human health protection paramount
- **Reduce training/readiness**
  - Restrictions on use of ranges
- **Restrict availability and/or cost of materials or chemicals**
  - Adverse impact on mission-critical applications & industrial base community
- **Increase O&M and/or cleanup costs**
  - Resource drain from mission needs

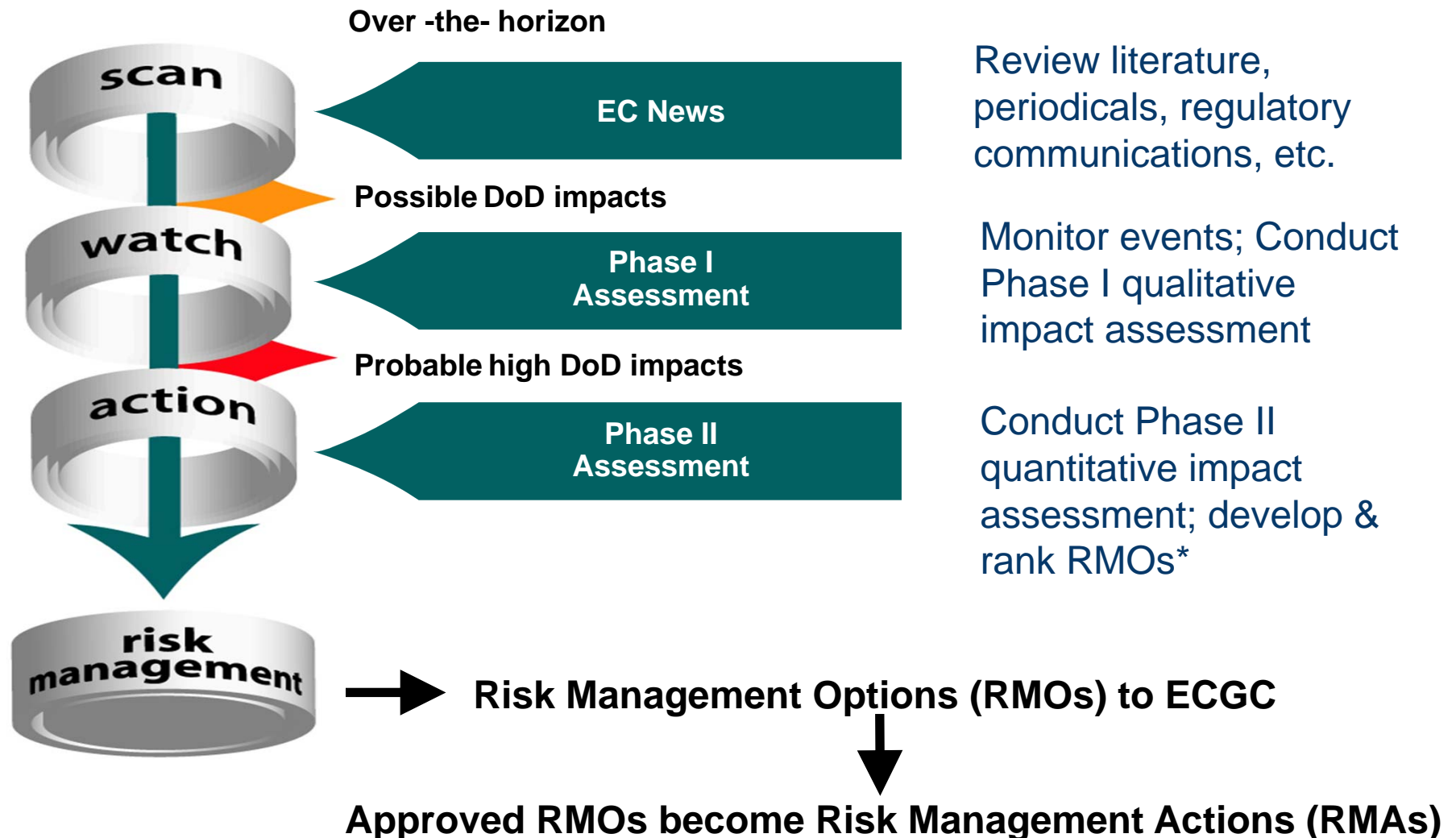
# EC Examples – Past & Present

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- **Ozone Depleting Substances – Refrigerants, fire suppressants, solvents...phased out of production**
- **Perchlorate – Munitions/propellant oxidizer...highly water soluble...affects thyroid function...intense Congressional interest regarding DoD releases**
- **Hexavalent Chromium – Heavy metal used in weapons systems/platforms...revised 10-fold reduction in Permissible Exposure Level (PEL)**
- **PFOA – Used to make fire retardant/high performance materials...bio-persistent....95% phase-out by 2010...100% by 2016**
- **Naphthalene – Component of JP-8/fuels used throughout DoD. Proposed “carcinogenicity” listing by EPA. New toxicity levels could have major impacts**
- **Sulfur Hexafluoride – Global warming gas used in essential applications**

# EC “Scan-Watch-Action” Process

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# Phase I Impact Assessment Process

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1

Likelihood of Toxicity  
Value/Regulatory Change

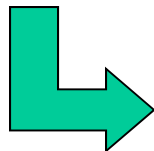
2

Scoping and Data Collection

3

Impact on DoD Functional Areas

ES&H	Training & Readiness	Acquisition/ RDT&E	POMD of DoD Assets	Cleanup
H	H	H	H	H
M	M	M	M	M
L	L	L	L	L



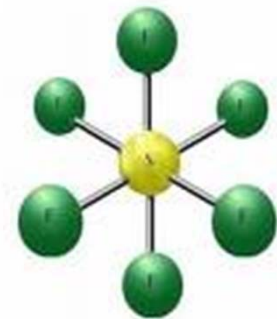
Results:

- Recommendation – Move to Action List?
- Initial Risk Management Options

# Sulfur Hexafluoride (SF<sub>6</sub>) Background

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- **A non-flammable, non-toxic gas – no human health concerns**
- **Extremely stable, with excellent dielectric properties (electrical insulation and arc-quenching)**
- **A high global warming potential – 22,800 times more potent than carbon dioxide (CO<sub>2</sub>) – long lasting in the atmosphere**
- **Average global SF<sub>6</sub> concentration has increased by about 7 percent per year during the 1980s and 1990s**



# SF6 Commercial Uses

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- **High-voltage electrical switchgear & transformers**
- **High-energy imaging equipment**
- **Research — atomic particle tandem accelerators**



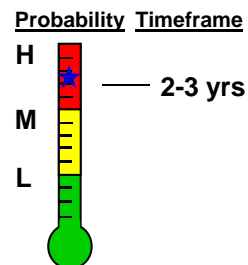
# SF6 Phase I Impact Assessment

Completed January 2008

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## Likelihood of Toxicity Value/ Regulatory Change

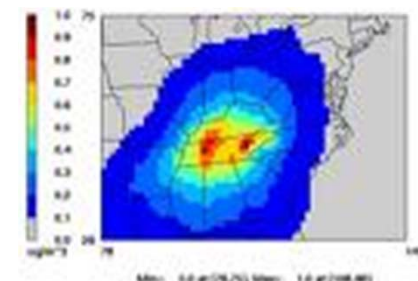
1. Probability that Greenhouse Gas emission initiatives will restrict use/availability of SF6



# SF6 Military Uses

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- **Pressurization/dielectric for aircraft targeting pods/avionics — Airborne Warning and Control System (AWACS) radar (e.g., E-3 Aircraft)**
- **Waveguide pressurization for shipboard targeting radar (e.g., MK 92 Fire Control System)**
- **Comprehensive Nuclear Test Ban Treaty monitoring and nuclear event detection**



# SF6 Phase I Impact Assessment

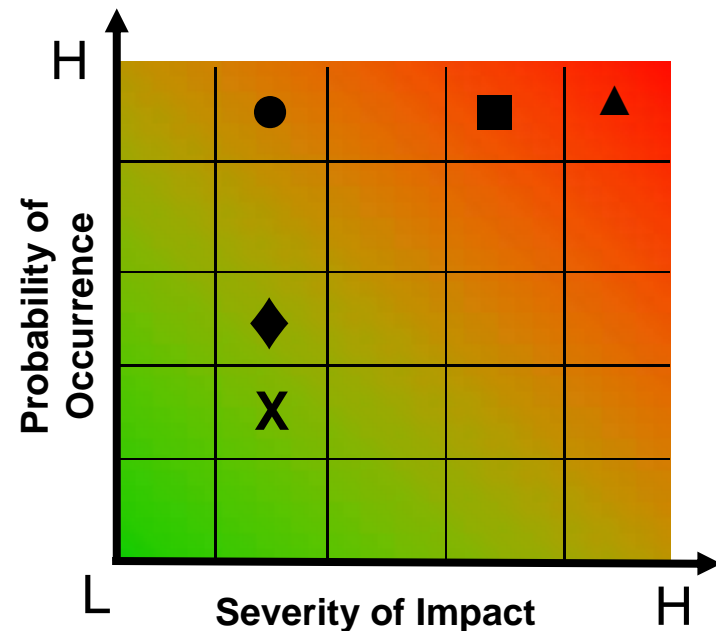
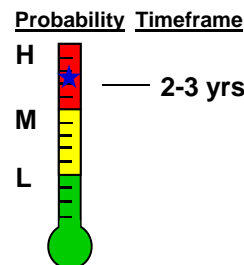
Completed January 2008

Acquisition, Technology and Logistics

Sulfur Hexafluoride (SF6) is used in radar systems (e.g., AWACS aircraft); helicopter rotor-blade leak tests; discharge testing in fire suppression systems; electrical switch gear; and propulsion systems for specific weapons (e.g., MK-50 torpedo) in service and under design.

## Likelihood of Toxicity Value/ Regulatory Change

1. Probability that Greenhouse Gas emission initiatives will restrict use/availability of SF6



- ◆ ES&H
- Training & Readiness
- ▲ Acquisition/RDT&E
- PO&MD of Assets
- X Cleanup

# EC Action List — Jan 2011

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- ✓ **Royal Demolition eXplosive (RDX)**
  - **Cyclotrimethylenetrinitramine**
- ✓ **Hexavalent Chromium (Cr6+)**
- ✓ **Naphthalene**...pending downgrade to watch list
- ✓ **Beryllium (Be)**
- ✓ **Sulfur Hexafluoride (SF6)**
- ✓ **Lead**

✓ **Phase II Impact Assessment completed.**

# EC Watch List – Jan 2011

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- ✓ Tungsten alloys
- ✓ Sodium tungstate
- ✓ 1,4-dioxane\*
- ✓ Nanomaterials
- ✓ Perfluorooctyl sulfonate (PFOS)
- ✓ Di-nitrotoluenes (DNT)
- ✓ Nickel
- ✓ Cadmium
- ✓ Manganese
- Cerium
- Cobalt
- Antimony
- ✓ Perfluorooctanoic acid (PFOA)
- **Phthalates** ...recently added
- **Diisocyanates** ...recently added
- **TCE** ...moved from action list
- **Perchlorate** ...moved from action list

✓ Phase I Impact Assessment completed

\* To be re-assessed

# Lead — Why on the Action List?

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- **Evolving science & regulations pose a risk to range operations...most munitions contain lead**



- **Lead-free electronics pose a risk to DoD supply chain...short-circuiting in components**



# EC Program Scorecard

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- **Screened 413 potential ECs**
- **Completed 25 Phase I Impact Assessments**
- **Completed 7 Phase II Impact Assessments**
  - Beryllium, lead, sulfur hexafluoride (SF6), hexavalent chromium, naphthalene, trichloroethylene (TCE), perchlorate<sup>1</sup>, & RDX<sup>2</sup>
- **54 Risk Management Options (RMOs) developed & turned into Risk Management Actions (RMAs)**
  - 39 in-progress, 11 completed, 3 pending, 1 deferred (low risk)

<sup>1</sup> Perchlorate was original EC — no Phase II assessment but RMOs developed and approved by ECGC

<sup>2</sup> A defense related explosive compound

# Department of Defense Emerging Contaminants Program

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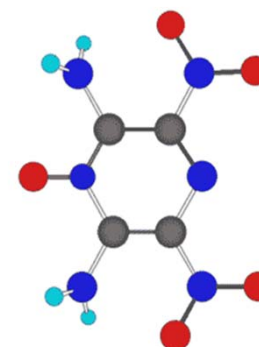
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**Harvard University – Ash Institute for Democratic Governance & Innovation**

# Questions & Discussion

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# Back-up Slides

# Planned FY-11/12 Phase I Impact Assessments

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- **Nanomaterials...partially completed Nov 2010**
- **Diisocyanates...completed February 2011**
- **Phthalates...next**
- **Cobalt**
- **Antimony**

# Latest Risk Management Actions

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- **Naphthalene**
  - Real-time dosimeter developed via SBIRP<sup>1</sup>...new technology
  - Multi-agency funding approved...awaiting FY-11 OSD funding for approved human exposure testing
  - WET Center will independently test dosimeter accuracy
- **Hexavalent chromium (Cr6+)**
  - DFAR rule at OMB for review prior to FR publication
  - Accelerated corrosion testing protocol being developed by SERDP
  - Project underway by CTC on minimizing legacy uses
    - Work with specification owners to specify suitable substitutes
  - SERDP conference session show-cased successful substitute process projects including “project of the year”
    - Medium caliber gun barrels non-CR6+ process

<sup>1</sup> Small Business Innovative Research Project

# Latest Risk Management Actions

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- **SF6**
  - Recovery/recycling policy memo signed 20 OCT by PD-USD(AT&L)
  - AF RDT&E
    - Infrared leak detection
    - SF6 substitutes for AWACs radar wave guide system
- **Beryllium**
  - Life-cycle study underway by CTC focusing on maintenance activity exposures and end-of-life
  - Visit to Hill AFB completed...interesting results
- **Perchlorate**
  - Field guide for use of isotopic analysis to be completed soon
  - Primary researcher and DoD-EDQWG collaborating

# 2010 ECGC Decisions

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1. Downgrade **Perchlorate** & **TCE** to EC Watch List
2. Endorse\* **RDX** RMOs
3. Endorse\* **Lead** RMOs
4. Terminate **Tungsten** work group
  - Nanomaterials work group to continue

**\*Note: “Endorse” means there is consensus within the Governance Council that the recommended actions are worthwhile. Individual OSD and Component Program Managers will make decisions on whether to fund & implement the actions in consideration of other program priorities. CMRM staff will track implementation progress and risk reduction.**

# Downgrading Perchlorate to Watch List

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- **Risk Management Actions have reduced risk**
  - Latest (April 2009) DoD Policy in a series ensures releases are addressed
    - Sampling database with over 50,000 samples
    - Releases mainly contained on installations & remedial actions underway/completed
  - DoD R&D played a key role...Isotopic analysis technique differentiates between natural & man-made sources
  - Congressional, press, and EPA briefings to dispel perchlorate myths
    - Main message: DoD not the major source of drinking water contamination
  - Army R&D on perchlorate substitutes paying dividends
    - New ground burst simulators being deployed
- **GAO Review on perchlorate contamination in U.S. completed July 2010**
  - No recommendations...implies that DoD releases under control...notes non-DoD sources (e.g., fertilizer) contributing to contamination

# Downgrading TCE to Watch List

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- **Risks to Cleanup Program Costs**

- DoD & EPA developed interim toxicity levels to avoid regional inconsistencies & disputes
- Final EPA risk assessment supersedes interim levels but are about the same
- Cleanups handled routinely by DERP<sup>1</sup>
- Vapor intrusion issues remain...RMAs underway to address

- **Risks Related to Continued Use**

- About 80% of DoD use at Anniston Army Depot (ANAD)
- Major projects underway at ANAD to develop cleaning processes with substitutes

<sup>1</sup> Defense Environmental Restoration Program

# How to Handle ECs Under DERP

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## Key Factors to Consider Before Actions

- **Is there exposure or potential for exposure?**
  - What are pathways and receptors?
- **What's the status of toxicity values?**
  - IRIS, PPRTVs, Other (state)
- **Are other non-ECs present?**
- **Will the proposed treatment also remediate ECs?**
- **What are the potential risk management options?**
  - Watchful waiting (monitoring only)
  - Halt the plume
  - Remediation